

**PORT OF PORTLAND**

**VANPORT WETLANDS**

**COMPREHENSIVE MANAGEMENT PLAN**

**July 2004**

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# **PORT OF PORTLAND VANPORT WETLANDS SITE**

## **COMPREHENSIVE MANAGEMENT PLAN**

### **1 INTRODUCTION AND BACKGROUND**

The Vanport Wetlands property (site) is an approximately 90-acre mitigation site located in north Portland and owned by the Port of Portland (Port). The site is currently located in an industrial area, bordered to the north by Metro's Expo Center, to the east by an access road for the Expo Center (Expo Road) and the Tri-Met interstate rail line, to the south by the Portland International Raceway (PIR), and to the west by Broadacre Street along with an undeveloped property owned by the Port and an overflow parking area owned by Metro at the northwest corner (Figure 1). In addition, located within a few hundred feet from the site is Interstate Highway 5 to the east, North Slough to the Southwest, and Heron Lakes Golf Course to the west.

#### **1.1 Historical Setting**

Prior to European settlement, the Vanport Wetlands site was described as a mostly marshy area with a small lake in the northern area, connected to a system of sloughs to the south (General Land Office map 1852). By the early 1900's, the site's lake was given the name Force Lake and it occupied the site's entire low basin area. The system of sloughs was a complex waterway consisting of wetlands, open water ponds, and drainageways hydrologically driven by the seasonal fluctuations of the nearby Columbia River to the north and the Willamette River to the south. Even at today's repressed ordinary high water (OHW) river elevations, the general ground surface elevation of the Vanport Wetlands bottomland wetlands (elevation 4 to 5 ft NGVD) sits several feet lower than the OHW elevations of either the Columbia River (elevation 17.6 ft NGVD at OHW) or Willamette River (elevation 16.6 ft NGVD at OHW) in the vicinity of the site. Thus, historically there was seasonal flooding of the Vanport Wetlands area along with extended upward pressure on groundwater which probably resulted in a seasonally high groundwater table.

To protect the site from seasonal flooding, a complex of dikes, drainageways, and mechanical pumping stations were installed beginning in 1917 by the new Peninsula Drainage District No. 1 (Pen 1). In the early 1920's, the lake was drained and the majority of the site converted to agricultural row crops. Agriculture continued at the site when the community of Vanport was developed on the surrounding areas to serve the war effort of the 1940's. Also during this time, the site was used for transmitting radio signals, with transmitter towers installed in the 1930's, and a transmitter building constructed by 1935. The radio station, KGW-AM, was one of the earliest commercial stations in Portland, and the site has long been associated with this use.

For the most part, this flood protection system performed satisfactorily, allowing development of the Vanport area along with a severe disconnection with the nearby rivers' hydrologic cycles. This was all briefly interrupted in May 1948 by the Vanport flood, caused when a dike on the Columbia River failed and gave way during high water flooding the entire Vanport area including the Vanport Wetlands. The Vanport flood temporarily disrupted both agricultural and radio transmission activities, with numerous residential buildings floating onto the site from nearby housing complexes along with other flood debris.

Following the flood, the Vanport community was abandoned and new developments in the area took shape, including the Portland International Raceway (PIR), the Heron Lakes Golf Course and the Expo Center, all adjacent developments to the present mitigation site.

Following a comprehensive evaluation of potential mitigation properties and discussions with the Columbia Slough Watershed Council, the Port purchased the Vanport Wetlands property in May 1999, effectively ending commercial radio's tenure at the site. In December 2000, the Port removed the underground copper grounding wire network, and on December 26, 2000, the two 625-foot high transmission towers were removed. The radio transmitter building and access roads are all that remain on the site today from its use as a transmission facility. The transmitter building is listed in the Historic Resource Inventory for the City of Portland (City) as a Rank III resource (Rank III resources are recognized in the City's inventory but are not afforded protection under City ordinances) and has been recommended for listing on the National Register of Historical Places by the State Historic Preservation Office.

## 1.2 Previous Studies

There are a number of studies providing assessments of recent conditions at the site:

Natural Resources Management Plan for Peninsula Drainage District No. 1 (City of Portland Bureau of Planning, July 1997) - The Natural Resource Management Plan (NRMP) is a planning tool for the overall Peninsula Drainage District No. 1 (Pen 1), of which the Vanport Wetlands site is a part. The NRMP provides a mechanism to coordinate mitigation and enhancement activities within the Pen 1, and thus is an integral part of the site's mitigation plan. The NRMP identifies management objectives for land use and recreation, hydrology, water quality, wetlands and other natural areas and wildlife habitat. In addition, the NRMP sets natural resource policies and mitigation requirements within the Pen 1 area.

Multnomah County Corrections Facility Vanport Wetlands Site Wetlands Study Report (Adolfson Associates, Inc., September 1997) - The Adolfson Associates Wetland Report details their wetland delineation study performed at the Vanport Wetlands site in 1997. The wetland delineation was part of the larger study to assess suitability for constructing a new jail at the site. In addition, an assessment on the site's wetlands functions and conditions and wildlife habitat were performed. The report findings of 62.3 acres of existing wetland habitat were confirmed by both the Corps (April 10, 1998) and DSL (April 21, 1998) and are used in the mitigation plan to calculate the original mitigation credit available at the site.

Cultural Resources Investigations for a Proposed New Multnomah County Correctional Facility, Portland, Oregon (Archeological Investigations Northwest, Inc., November 1998) - The Archeological Investigations Northwest (AINW) cultural resources report provides information on their preliminary cultural resources inventory performed at the site in 1997, as well as a detailed historical treatise of site conditions and utilization. AINW located one archeological site consisting of a buried charcoal deposit but did not feel it was a significant resource. In addition, AINW identified the existing radio transmission facilities as eligible for listing on the National Register of Historic Places.

In addition, the following reports have been issued to regulatory agencies to address permit conditions of the current Vanport Wetlands wetland mitigation program:

- *Port of Portland Vanport Wetlands Site Wetland Mitigation Plan*; May 1999

- *Vanport Wetlands Wetland Mitigation Project Status Report-December 1999, December 1999*
- *Port of Portland Vanport Wetlands Site Wetland Mitigation Plan - Airfield Safety Improvement Project, December 1999*
- *Port of Portland Vanport Wetlands Wetland Mitigation 2000 Status Report, November 2000*
- *Port of Portland North Simmons Road Wetland Mitigation Plan, September 2001*
- *Port of Portland T-5 Powerline Mitigation Acreage Compensation Wetland Mitigation Plan, June 2002*
- *Port of Portland PIC Subdistrict B Development Wetland Mitigation Plan*
- *Port of Portland Vanport Wetlands Mitigation Site As-built Report, June 2003*
- *Port of Portland Vanport Wetlands 2003 Mitigation Monitoring Report - Year 1*

### **1.3 Tri-Met Construction**

At the time of purchase of the Vanport Wetlands site, the Port set aside 0.55 acres of wetlands along the eastern boundary of the property to sell to Tri-Met for North Expo Road improvements and construction of a section of the Interstate Max line. Construction included the removal from the property of several trees greater than 6 inches diameter at breast height, and these have been stockpiled on the site for placement in the wetlands. Tri-Met completed road improvements in July 2002. Stormwater runoff along the southern portion of the road is collected into a stormceptor water quality manhole prior to discharge onto the site. Runoff along the rest of road is via sheet flow which flows onto the wetland after percolating through a 2-foot wide sand filter. The sand filter can be removed and replaced if a build-up in contaminant concentrations in the filter requires this. Rainwater seepage along the rail track percolates through the track ballast and is gravity fed to a ditch in the northern portion of the property. This water is pumped off the site into the North Slough via the site's pumping system.

### **1.4 Wetland Mitigation**

The Port originally purchased the Vanport Wetlands site to perform mitigation for the filling of wetlands at Portland International Airport (PDX) and the nearby Portland International Center (PIC). Wetlands were filled at PIC in 1999 for transit-oriented development (Cascade Station), and at PDX in 2000 for airfield safety improvements (DSL Permit No. FP-17198-Modified; Corps Permit No. 99-632). The PIC project involved 5.77 acres of wetland fill, resulting in 17.31 acres of mitigation, while the PDX project involved 8.25 acres of fill resulting in 24.75 acres of mitigation (Figure 2). In 2003 the Port also applied to use 10.23 acres of wetland as mitigation for 5.47/3.41 acres of wetland fill in the development of PIC Subdistrict B (Corps Permit No. 99-632 modified; DSL Permit No. 30286-RF). All three mitigation projects utilize a mitigation acreage to impact acreage ratio of 3:1 for wetland enhancement for state requirements and at least 1:1 replacement of function for addressing federal requirements. The Port has proposed to use the remaining credit on the site as mitigation for wetland fill impacts in the Southwest Quad portion of the airfield.

The Port is also using the site for mitigation related to two wetland fill projects in the Rivergate Industrial District. Commercial development resulted in the fill of 0.22 acres of wetlands at the Port's North

Simmons Road property in 2002, and 12.5 acres of wetlands were filled during construction of the bulk materials handling facility at Terminal 5 in 1995. Mitigation for the 12.5 acres first took place at the T-5 Powerline mitigation site in south Rivergate in 1995, however erratic hydrology on that site resulted in a shortfall of 4 acres. As a consequence, the Agencies approved compensation for these 4 acres by mitigation at the Vanport Wetlands site. Mitigation for these fills is occurring in upland areas of the property where water management, which is part of the mitigation plan, is restoring historical wetlands. These projects utilize a mitigation ratio of 1:1 for wetland restoration.

Additionally, the Port is performing mitigation for the City of Portland, Bureau of Development Services (BDS) for impacts from ground disturbance at the site relating to the removal of an underground copper wire grid used with the former radio transmission facilities. This mitigation involves enhancing approximately 0.12 acres of existing wetland within the site's northwest drainage.

### 1.5 Mitigation Goals and Objectives

The central focus of the mitigation project is to enhance the existing bottomland wetlands by reducing the existing reed canarygrass and increasing native wetland plants. This is being performed in a step-like fashion incorporating adaptive management, where reed canarygrass control methods were implemented first, followed by a hydrologic assessment of the new inundation regime, establishment of the new vegetative communities and maintenance and monitoring of the wetlands to meet the mitigation project goals. The following Table 1 lists the mitigation goals, objectives, performance standards and monitoring instructions.

**Table 1 Mitigation Goals and Objectives**

Mitigation Schedule - Goals, Objectives, Performance Standard, and Monitoring Instructions			
Goal	Objective	Performance Standard	Monitoring
Reduce the reed canarygrass monoculture.	Extend the duration and increase the depth of inundation.	<30% frequency of reed canarygrass in the emergent wetland and <20% in scrub/ shrub locations at the end of the 5-year monitoring period.	Assess through annual vegetation monitoring.
Establish a more diverse, native-dominated wetland vegetation (PEMc).	Direct seed/plant approximately 21 native emergent wetland species following reduction of reed canarygrass.	Native species are dominant (>50%) at the end of the 5-year monitoring period.	Assess through annual vegetative monitoring.
Establish a more diverse, native-dominated wetland vegetation (PSSc).	Plant 5.0 acres with approximately 2 native wetland scrub-shrub species following reduction of reed canarygrass.	Native species are dominant (>50%) and meet a minimum stem count at the end of the 5-year monitoring period.	Assess through annual vegetative monitoring.



Mitigation Schedule - Goals, Objectives, Performance Standard, and Monitoring Instructions			
Goal	Objective	Performance Standard	Monitoring
Establish buffer areas where lacking around the perimeter of the property.	Reduce existing non-desirable vegetation; seed and plant approximately 10 species of native trees, shrubs, and herbaceous species.	80% survival of all trees and shrubs at the end of the 5-year monitoring period.	Assess through annual vegetative monitoring.
Protect adjacent areas from flooding	Utilize MCDD pumping station with a revised elevation activation setting	None	Assess as-needed in conjunction with MCDD
Restore wetland habitat adjacent to the existing wetland	Utilize extended duration of inundation	Annually meet wetland criteria (Corps 1987 Wetland Delineation Manual)	Assess through wetland determination (soils, hydrology, vegetation)

### 1.6 Mitigation Plan

The mitigation plan incorporated a number of physical modifications to the site, including a low, earthen berm in the northern portion of the property in order to prevent flooding of Expo Road and the site's north ditch, reconfiguration of the drainage channels to provide a more meandering swale system and chemically spraying, mowing, plowing, disking and seeding of the central wetland in order to further stress the reed canarygrass. The plan included enhancement of the upland habitat and enhancing the vegetated buffer around the boundary of the property. All modifications to the site were completed by February 2003.

## 2 REGULATORY SETTING

The Vanport Wetlands site is currently under federal, state, and local (City) regulatory oversight that involves wetland habitat, zoning and drainage operations. Internal approval of Port actions concerning the site is spearheaded by the Port's Mitigation Management Team in the Property and Development Services Department, with final oversight provided from the Port Commission. Finally, other public agencies, organizations and private parties may comment on certain regulated activities through the public comment process.

### 2.1 Federal Regulation

Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (Corps) regulates the discharge of fill material in waters of the United States, of which wetlands are included. The Port was required to obtain Corps-authorized wetland fill permits which required that mitigation to compensate for the loss of wetlands was carried out.

### 2.2 State Regulation

State of Oregon regulation is through the state "Removal-Fill" permit program which applies to "waters of the state" of which wetlands are a part. The Port was required to obtain removal/fill permits through the Division of State Lands (DSL), and compensation for the wetland fills was required as part of the permit.

In Oregon, the Department of Environmental Quality (DEQ) will, for some projects, require a water quality certification (Section 401 of the Clean Water Act) before a wetland fill permit can be issued by the Corps or DSL. The Port successfully obtained water quality certification prior to issuance of the wetland fill permits.

### **2.3 Local Regulation**

Development activities at the Vanport Wetlands site are regulated locally by the City of Portland Environmental Overlay Zones. The site is located wholly within the City's Environmental Conservation Zone (C-Zone), designated to areas where significant natural resources and functional values can be protected while allowing environmentally sensitive urban development. Land use and development within a C-Zone needs to be permitted through the City's Bureau of Development Services (BDS).

Because the Vanport Wetlands site is located within an actively managed drainage district (Pen 1), the manipulation of the site's surface hydrology is regulated in-part by Multnomah County Drainage District (MCDD). The purpose of Pen 1 is to provide flood control and stormwater management to the developments within the low-lying Pen 1 area. The Port has worked closely with MCDD staff since the project's conception to develop a hydrologic regime that serves to control reed canarygrass while allowing the site to also be managed for temporary stormwater storage. Manipulation of the site's existing pump station as outlined in the mitigation plan is performed under the authorization of the MCDD.

### **2.4 Easements and Agreements**

#### **2.4.1 Conservation Easement Between the Port of Portland and Multnomah County Drainage District No. 1**

The Port of Portland and the Multnomah County Drainage District have entered into a conservation easement, consisting of 90.44 acres of wetland and upland, for the Vanport Wetlands Mitigation area. Covenants of the easement include, among others:

1. No change is permitted to the natural habitat of the protected property except as set forth in the mitigation plan;
2. No agricultural, commercial or industrial activity shall be allowed on the protected property;
3. No domestic animals shall be allowed on the protected property;
4. There shall be no filling, excavating, dredging, mining or drilling; no removal of topsoil, sand, gravel, rock, minerals or other materials, nor any dumping of ashes, trash, garbage or any other material and no changing of topography of the land of the protected property except as required by or as necessary to comply with the wetland mitigation plan for the maintenance of drainage ditches or roads, as required for security or pursuant to the removal of the Vanport Wetlands or grounding systems.
5. There shall be no construction or placing of buildings, mobile homes, advertising signs, billboards or other advertising material or other structures on the protected property except for fencing as reasonably required in the discretion of the Grantor. This does not include the existing buildings or existing roads on site.
6. There shall be no building of new roads or any other new rights of way, nor widening of existing roads onto the protected property, except as may be required by the Oregon Department of Transportation, the City of Portland or Tri-Met for the extension of light-rail adjacent to the protected property.
7. There shall be no operation of any type of motorized vehicles on the protected property except as reasonable and necessary to carry out the mitigation plan or maintain the protected property.

8. Any use of the protected property which is inconsistent with the preservation of the property as a wetland is prohibited.

#### 2.4.2 Portland General Electric Easement

An easement to Portland General Electric Company was granted on July 27, 1984 for the perpetual right to enter upon, erect, maintain, repair, rebuild and patrol electric power lines. This includes the right to control vegetation within the confines of the overhead lines. These lines supply power to the transmission building and the stormwater pump used to control water levels on the site.

#### 2.4.3 Multnomah County Easement

A perpetual easement to Multnomah County was granted on May 24, 1973 for slope maintenance and access rights for N. Expo road slopes. N. Expo Road extends from the southeastern corner of the property to the northeastern corner.

#### 2.4.4 Tri-Met Easement

An exclusive perpetual easement 24' wide was granted August 24, 2001, for purposes of egress and ingress between N. Expo Road and Vanport Wetlands.

#### 2.4.5 MERC Right of Entry

A perpetual, nonexclusive easement from Metro to the Port was granted for pedestrian and vehicle ingress and egress over and across South Access Drive.

### 3 EXISTING CONDITIONS

Existing conditions at the Vanport Wetlands site are the result of both former and current land-use practices, both within the site and within the region as a whole. The historic connections to the larger river systems that were so influential in forming and maintaining historic habitat have been severed completely, resulting in hydrologic processes drastically different from historic conditions. Enhancement and management of natural resources at the site must develop within the framework and understanding of both the existing conditions at the site and within the overall surrounding area.

#### 3.1 Hydrology

Existing hydrology at the Vanport Wetlands site consists of surface water and shallow groundwater, both of which directly influence the type and quality of habitat the site supports. Currently, the site pumping station and water control weir allow for seasonal ponding (up to 8.5 feet NGVD).

##### 3.1.1 Surface Hydrology

Surface hydrology consists of point and non-point inflows onto the site and controlled outflows (pumping) off the site. Inflows are a result of direct precipitation (~35" annually), and accompanying stormwater runoff from adjacent properties. Precipitation falls mainly from October through June, with the heaviest amounts occurring in the winter months of December through March. Stormwater runoff enters the site primarily from the Expo Center property to the north, with lesser inputs from Expo Road and Interstate 5 to the east and Portland International Raceway's (PIR) north parking area to the south (Figure 2; Table 2). The stormwater inflow area onto the site is not large, however the source-area is mostly impervious surface.

**Table 2 Treatment of Stormwater Discharges onto Vanport Wetlands**

Drain location	Type	Source	Treatment	Responsibility
Expo North 1	Outfall	Expo parking lot	stormceptor, N of Expo Rd	Expo
Expo North 2	Outfall	Expo parking lot	stormceptor, N of Expo Rd	Expo
Expo North 3	Outfall	Expo parking lot	stormceptor, N of Expo Rd	Expo
North Ditch	culvert	Tri-met track ballast; I-5 runoff	none	City of Portland
Expo Road north	Sheet	Expo Road	2-foot wide sand filter then percolation through riprap	City of Portland
Expo Road south	Outfall	non-roadway ground and stormwater	none	City of Portland
PIR	Sheet	grass parking area	percolation	PIR

Surface water has no natural outflow off the site, due in-part to its low-lying position on the landscape, its historical developments and development modifications made to surrounding properties. In order to keep the site free from standing water for development purposes, the Pen 1 Drainage District constructed a mechanical pumping station on the site in the 1920's to pump excess surface water from the central wetland to a modified drainageway on the western portion of the site. The drainageway gravity-flows off-site into North Slough to the southwest. Evapotranspiration and groundwater recharge also affect seasonal surface water levels.

The site's western drainageway is broken up into two sections: the northwest drainageway and the southwest drainageway (see Figure 2). These two sections are hydrologically connected via an underground pipe located between the two. The northwest drainageway exists mostly as a straight and narrow channel flowing south and receives pumping outflows and offsite stormwater runoff from the Expo property. The channel is confined to the east by a steep embankment, while overflows can access a small bench area on the west before being confined by another steep embankment. The northwest drainageway ends at the mid-point of the site where flows are piped underground for approximately 400 linear feet. The flow emerges from the pipe into the north end of the southwest drainageway. The southwest drainageway consists of a relatively broad (10-25 feet wide) swale confined by steep embankments on either side. Flows exit the southwest drainageway through a culvert under Broadacre Street and enter North Slough off-site on the PIR property.

### 3.1.2 Groundwater Hydrology

Groundwater levels at the Vanport Wetlands are influenced primarily by the site's low-lying position on the landscape and the presence of the mechanical pump station. However, the close proximity of the site to two large river bodies, the Willamette River approximately 3 miles to the south, and the Columbia River approximately 2 miles to the north, also affects levels. The surface elevation of the bottomland wetland is approximately 11 to 12 feet below the OHW elevations of the Willamette and Columbia Rivers, respectively. The low-lying position of the site and the high water elevations the rivers seasonally attain influence the site's groundwater elevations.

Groundwater elevation monitoring at the site shows that during the dry summer months when no pumping occurs, groundwater drops to depths of 1 to 2 feet below the ground surface and rises quickly with the onset of seasonal fall rains (Figure 3).

### 3.1.3 *Pump Station and Water Control Weir*

Multnomah County Drainage District controls the settings on the site's pump station which can be easily modified to pump water at a selected elevation. Prior to the winter of 2000, pumping occurred at approximately elevation 5 NGVD. This prevented surface water from accumulating on the majority of the site and protected the former radio transmission facilities from flooding. Following a proposal by the Port to use flooding as a means of reed canarygrass control, an evaluation of potential impacts to adjacent areas from flooding was performed by the MCDD with hydrologic modeling (May 2000). The results of the modeling indicated a surface barrier (berm) and water control weir needed to be constructed along the south bank of the north ditch to allow flow from the Expo stormwater outfall into the north ditch and to prevent potential flooding of Expo Road in that area.

Construction of an earthen berm along the north end of the site (south bank of the northern ditch) and the installation of a water control weir were completed in December 2001 as part of the mitigation design. These features allow flooding to an elevation of 8.5 feet NGVD and allow the minimum 2.5-foot target depth of inundation for reed canarygrass control to be achieved throughout most of the wetland site without adversely impacting adjacent properties to the north.

Drawdown is carried out by MCDD under direction from mitigation staff. The rate and extent of drawdown is determined through evaluating water depth and vegetation cover and using adaptive management to achieve mitigation goals. During the 2000/2001 winter season, which was prior to the construction of the berm, pumping was modified to allow some surface water to accumulate on the site. By 2002, the flooding-drawdown regime was being implemented. Information on drawdown during 2002 and 2003 is shown in Table 3.

**Table 3 Drawdown During 2002 and 2003**

Start Date	Start Elevation	End Date	End Elevation	Days to complete
7/8/02	7.0 feet NGVD	7/18/02	4.2 feet NGVD	10
7/1/03	7.0 feet NGVD	9/16/03	2.5 feet NGVD	53

## 3.2 Water Quality

Water quality sampling, conducted twice annually from four locations around the site, has indicated that a number of heavy metals are found in low concentrations on the site with most within EPA guidelines for protecting aquatic freshwater life. Only the central wetland has exhibited slightly elevated lead concentrations. No DDT or DDE has been detected. Total phosphorous and total coliform levels are highest in the central wetland, this being attributed to the large numbers of birds using the wetland. Parameters tested included arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, 4,4'-DDE, 4,4'-DDT, oil and grease, polyaromatic hydrocarbons, turbidity, pH, phosphorus and total and fecal coliform. The Port carries out an on-going program for monitoring water quality on the site.

## 3.3 Soils

Site soils range from heavy silty clay loams in the bottomland wetland to friable silt loams on the higher

reaches of the adjacent uplands. The existing soils reflect both the environment in which they formed and past land use practices that included farming and other localized development.

The bottomland wetland soil is a Sauvie silty clay loam that formed in floodplain alluvium from the nearby Columbia River. It is a very deep, poorly drained soil, ideal for holding water and establishing wetland vegetation. These soils were drained for farming around 1920, a practice that continued for more than 40 years.

As site topography gently rises up adjacent to the bottomland, the soils become gradually less clay and more silt, resembling the silt loam version of the Sauvie soil at the top of the rises. The gradation from clay to silt is gradual and consistent. The silty soils are generally moderately well drained and are productive for native riparian and upland vegetation. These soils have also been farmed, and some have been cut or filled for the construction of roads, buildings and drainageways.

### 3.4 Soil/Sediment Quality

A preliminary soil investigation was performed at the site in October 2000 during which twelve soil samples were collected by URS Corporation from seven locations. Samples were analyzed for hydrocarbon, total metals, organochlorine pesticides, chlorinated herbicides and semi-volatile organic compounds. Results indicated low levels of several of the selected elements and compounds are present in the soils at the site, although only arsenic was detected at levels above its corresponding federal and state remediation reference level (URS Corporation, December 2000). The report indicated that arsenic soil concentrations at the site were most likely related to background levels of the naturally occurring element and further noted that high concentrations of arsenic in groundwater are widespread throughout the Willamette Basin. The report concluded that no further investigations were recommended.

### 3.5 Topography

Existing site topography ranges approximately from elevation 2.5 feet NGVD in the bottomland wetland to approximately elevation 18 feet NGVD at the top of the upland slope west of the bottomland (Figure 4). The bottomland wetland area is between elevation 2.5 and 8 feet NGVD, with most of its 60+ acres residing between elevation 3 and 6 feet NGVD. Project flooding will raise the wetland boundary elevation slightly as increased inundation and associated capillary fringe extend perimeter wetlands up to an estimated elevation of approximately 8.5 feet NGVD. Adjacent uplands are currently found between elevations 8 and 18 feet NGVD on flat benches and gentle slopes.

### 3.6 Site Habitats

The site is being managed to support six habitat types: emergent (PEM), scrub-shrub (PSS), and forested wetland (PFO); and meadow (UM), scrub-shrub (USS) and forested uplands (UFO) (Figure 5). Total wetland area is approximately 67.8 acres; total upland area is approximately 20.5 acres. The breakdown of habitat types is shown in Table 4.

**Table 4 Pre-mitigation and Post-mitigation Acreage of Habitat Types**

Habitat Type	Pre-mitigation acres	Post-mitigation acres
PEM	52.36	52.8
PSS	6.06	9.72

Habitat Type	Pre-mitigation acres	Post-mitigation acres
PFO	3.11	5.32
UM	6.39	6.39
USS	1.91	1.91
UFO	5.1	12.23
Other <sup>1</sup>	15.51	2.57
Total	90.44	90.94 <sup>2</sup>

<sup>1</sup> roads, structures, <sup>2</sup> includes 0.5 acre berm creation

### 3.6.1 Wetland Habitat

Wetlands were delineated on the site in 1997 by Adolfson Associates, and the report's findings were confirmed by the Corps and DSL. The wetland delineation was part of a previous study to assess suitability for constructing a new jail at the site.

Emergent wetland habitat is found in two locations of the site: the expansive bottomland wetland and the confined southwestern drainageway. Prior to mitigation activities, both of these areas were dominated by robust stands of reed canarygrass which provided limited wildlife habitat. The cessation of farming in the 1960's allowed reed canarygrass to aggressively take over the site, a common scenario for abandoned agricultural land throughout western Oregon and Washington. In addition, mechanical pumping of surface/ groundwater for flood control by MCDD prevented surface water from ponding, resulting in seasonally saturated soils at or near the surface through spring and creating suitable hydrologic conditions for reed canarygrass.

Scrub-shrub wetland on the site exists primarily within the northwest drainageway, with an isolated fringe area adjacent to Expo Road. Forested wetlands are present in the site's northwest drainage, mixed with areas of scrub-shrub habitat.

### 3.6.2 Upland Habitat

Prior to mitigation activities, upland habitat consisted of mostly disturbed habitat colonized by non-native invasive species. Exceptions to this were the tree components within the wooded uplands in the northern portion of the site and adjacent to the southwest drainageway.

## 3.7 **Functions and Values of Existing Wetland Conditions**

Functions and values of existing wetland conditions were performed as a part of the City of Portland's inventory and analysis of the Columbia Corridor (*Inventory and Analysis of Wetlands, Water Bodies and Wildlife Habitat Areas for the Columbia Corridor*, 1989), the NRMP (1997), the Adolfson and Associates wetland delineation report (*Multnomah County Corrections Facility Vanport Wetlands Site: Wetland Study*, 1997) and Fishman Environmental Services (FES) *Hydrogeomorphic Assessment of the Vanport Wetlands* (2003).

The City's inventory and analysis utilized the Wildlife Habitat Assessment (WHA) rating system that was developed for the City of Beaverton as part of their Goal 5 update for sites that contain wetlands or water bodies. The City's inventory analysis report identifies the Vanport Wetlands site as Site 53 (82 acres) that is within the Western Columbia Corridor subarea. The site is categorized as a large wetland with plant species that suggest recent plant disturbance. According to the report, plant diversity is limited and vegetation is almost entirely non-native. Fencing restricts entry of large wild and domestic mammals.

The report's "wildlife habitat inventory score" for the site is 24 (out of a possible 100) - a relatively low score.

The NRMP included an assessment of wetland functional values for the study area wetlands. While the assessment methodology did not represent the level of detail of WET II, it examined the same characteristics and conditions for the same major functional values. Each functional value (12 total) was rated as low, medium, or high. The results for the Vanport Wetlands site produced 9 low ratings, 3 medium ratings (wildlife habitat, food chain support, and flood storage), and 0 high ratings.

The Adolfson report utilized the *Oregon Freshwater Wetland Assessment Methodology* (Oregon Method) from information gathered during the wetland delineation field investigations and methods modeled after the Oregon Method. The report concluded that the Vanport Wetlands site's bottomland wetland area (Wetland A in the report) provided limited habitat for wildlife. The Northwest and Southwest Drainages (Wetlands B, C, and D in the report) received the highest value for wildlife and esthetics. These drainage wetlands also contributed to water quality and flood control. Isolated emergent wetlands in the vicinity of the central ditch and pumping station pond (Wetlands E, F, and G in the report) ranked low in all functions other than flood control.

The Hydrogeomorphic Assessment (HGM) prepared by FES for the Port evaluated pre-mitigation and predicted 5-year conditions (following mitigation) for the lakebed, back berm, linear ditches, wetland fringe, northwest swale and southwest swale. Existing conditions in the emergent wetlands received relatively high values for sediment stabilization, primary production and songbird habitat support while conditions in the swales received relatively high values for water storage, nitrogen removal and amphibian support. Predicted 5-year conditions substantially lifted the functional value in most of the evaluated categories for the lakebed and wetland fringe but resulted in only minimal increases for the back berm, linear ditches and swales. Primary productivity and songbird habitat were predicted to have a minimal decrease in value in several of these locations as a result of mitigation activities.

### **3.8 Vegetation**

#### **3.8.1 Pre-mitigation**

At the time of purchase, the bottomland wetlands were a monoculture of reed canarygrass, except for a small depression area in the central portion of the wetland that was a near monoculture of climbing nightshade, another invasive species. Other species with populations within the wetland at the time of purchase included: stinging nettle found scattered throughout; teasel and bedstraw along the outer margins; water plantain and nodding beggars tick along the margins of the centrally located depression area; and waterpepper, water smartweed, spotted ladythumb, cattails, soft rush, and duckweed within the central ditch.

Also at the time of purchase, the herbaceous strata of the site's western drainageways were dominated by reed canarygrass, except at the southern end where knotweed dominated. The uplands adjacent to the bottomland wetland were dominated by thickets of Himalayan blackberry. The northern cottonwood uplands have their shrub and herbaceous strata dominated by Himalayan blackberry, reed canarygrass, and stinging nettle.

#### **3.8.2 Post-mitigation**

Establishing more diverse, native-dominated vegetation has focused on native communities and species that can tolerate extended inundation with a gradual draw-down in the summer and fall. Site preparation



of the central wetland consisted of mowing and spraying in 2000 and in the summer of 2001 and plowing and disking in October 2001. The emergent wetland was then broadcast seeded with 11 species of rush, sedges, forbs and grasses, and 4400 wapato bulbs were installed. The swale was seeded with bulrush and bur-reed, and spike rush and wapato plants were installed along the benches.

The berm and elevations to about 10 feet NGVD surrounding the wetland were planted with a mix of native trees and shrubs. Approximately 1730 woody plants were installed in the restored wetland scrub-shrub habitat which extended from elevations 5 to 8 feet NGVD, and 621 trees and shrubs were installed in restored wetland forest habitat between 8 and 10 feet NGVD.

Invasive weeds in the upland forest and meadow areas surrounding the wetland were sprayed and/or mowed during October 2001 and then on a regular basis between April and October thereafter. In the southeast corner and west slope upland areas, this included thistle, blackberry, poison hemlock and teasel; in the northwest corner upland, this included blackberry thickets. In 2002 and 2003, surrounding upland habitat was interplanted with 824 woody native shrubs and trees.

Prior to planting, no buffers existed along the eastern and southern boundaries of the site. These areas were planted with native wetland shrubs and trees where elevations were appropriate. Buffers on the western and northern boundaries of the site were located in upland elevations, and these areas were interplanted to increase their buffering capacity.

### **3.8.3 Vegetation monitoring**

A wetland vegetation survey was conducted in 2001 to provide baseline mitigation monitoring data. Since then monitoring has been occurring annually to document the status of changes on the site. During monitoring for permit performance criteria, over 70 block or line transects are monitored over both wetland and upland areas of the site. Species recorded in 2001 (baseline) and 2003 are listed in Appendix A.

### **3.8.4 Weed Management**

Weed management has been ongoing on the site since the time of purchase. Although flooding is primarily used in the wetlands for reed canarygrass control, other cutting and spraying glyphosate have been employed to control additional invasive species in the wetlands, such as climbing nightshade. Purple loosestrife is currently absent from the site, however one mature (seed bearing) plant was discovered along the ditches early in the project (since destroyed). It can be assumed that viable seed is present at the site, and since the wetland enhancement will provide suitable loosestrife habitat, its presence/absence will be closely monitored.

A combination of mowing, weed whipping and spraying of selective herbicides are used to control invasive species in the uplands. A regular monitoring and maintenance program was developed to identify potential problem areas before they become unmanageable while protecting naturally recruiting native plants. Where large areas of weeds are removed, re-seeding or planting occur to compete with or shade out the invasive species.

## **3.9 Wildlife monitoring**

Casual wildlife observations are recorded during monthly inspections of the site and any other time notable observations are made. Over 100 bird species have been observed on the site since 2001. Birds of prey have been observed, including the peregrine falcon, bald eagle and great horned owl. Amphibian

surveys are conducted during the spring and late fall and have revealed the presence of Pacific treefrogs and long-toed salamanders over-wintering on the site, especially in the wooded areas. Red-legged frogs were observed once in 1999. Bat surveys have been conducted annually with USFWS and ODFW since 2002. Appendix B summarizes the results of the 2003 wildlife monitoring.

### **3.10 Cultural Resources**

Cultural resources of the Vanport Wetlands site were assessed by Archeological Investigations Northwest, Inc. (AINW) in conjunction with the jail location study in 1997 (*Cultural Resources Inventory of Three Proposed Locations For A New Multnomah County Corrections Facility, Portland, Oregon*, June 1997). Based on this preliminary study, AINW performed a cultural resource investigation in 1998 that included field investigations as well as a historical treatise of site conditions and utilization (*Cultural Resources Investigations For A Proposed New Multnomah County Correctional Facility, Portland, Oregon*, November 1998).

AINW located one archeological site consisting of a buried charcoal deposit but did not feel it was a significant resource. In addition, AINW identified the radio transmission facilities as eligible for listing on the National Register of Historic Places, and specifically that the transmitter building is a fine example of the Moderne architectural style. The radio towers and underground copper wire grid system were removed by the Port in 2000 under a Memorandum of Agreement between the State Historic Preservation Office, Army Corps of Engineers and the Port.

## **4 KEY ISSUES**

### **4.1 Public Access**

#### **4.1.1 Background**

The property is fenced and gated and currently only Port staff and visitors with prior approval from the Port are able to access the site (Figure 6). The property is under a five-year permit for wetland enhancement and monitoring, and certain performance standards related to habitat improvement must be met on an annual basis during this time. Urban-related problems have occurred in the past at the site. Trash and garbage have been dumped at the east entrance gate off N. Expo Road on several occasions, and during one period when the fence was removed, garbage dumping, dirt bike riding and stray dogs occurred on the site. As a consequence, site security will result in controlled access during the permit period which is expected to end in 2007. Individuals or groups can gain access to the grounds by contacting the site's manager.

The entrance road leading from the east access gate to the wetland is impassable during the flooded season (December through June). The entrance road from the north boundary of the property to the pump house and to the western boundary of the site remains accessible year round. The conservation easement permanently prohibits domestic animals (dogs, cats, horses, etc) from the site. The easement also permanently prohibits motorized vehicles on the site except for the existing access roads and limited paved area by the north gate.

#### **4.1.2 Considerations**

Providing public access will need to consider the sensitivity of the habitat, particularly during the overwintering migratory period and spring and early summer nesting period. Access to the wetlands will not be available from December through June, however the uplands along the western boundary would be

accessible all year. Domestic animals would need to be prohibited from the site, and parking is limited to a small paved area by the north gate entrance.

#### 4.1.3 Recommendations

- 1) The site should remain fenced to ensure habitat protection.
- 2) Following completion of the Port's permit requirements, the North Gate could be opened during certain times to allow public access.
- 3) If public access occurs, signs should be posted to prohibit domestic animals, bicycles and motorized vehicles.
- 4) Parking on-site should be discouraged.

### 4.2 **Trails**

#### 4.2.1 Background

No formal trails exist on the property. The entrance dirt road leading from the east access gate to the wetland is impassable during the rainy season (December through June), however during the dry season, this road leads to an unpaved path extending into the central area of the wetlands. An entrance road from the north gate to the pump house remains accessible year round. Also accessible year round is an upland dirt track that runs along the western upland boundary of the property (see Figure 6); this is used as a maintenance road. The conservation easement for the site prohibits the construction of new roads or widening of existing roads. Pedestrian trails are not prohibited.

The West Delta Park Recreation Plan proposes bike trails around the perimeter of the site outside the property boundary. Expo Road has a bike lane and sidewalk that allow viewing of the eastern portion of the wetlands. The Portland International Raceway (PIR) dog park, along the southern boundary of the property, provides an area for viewing the entire wetlands.

#### 4.2.2 Considerations

The entire wetland has been enhanced for mitigation so that new trails through the wetlands would not be possible. However, the existing path leading into the wetlands could be maintained as a trail. If new trails in the upland are constructed, they need to be sensitively placed so as to limit edge habitat as well as avoid disturbance to wildlife. Increased access will lead to increased disturbance which must be evaluated against conservation objectives for the site.

#### 4.2.3 Recommendations

1. The dirt track leading from the east gate to the central wetlands should be maintained as a path to allow access to the wetlands.
2. The existing dirt track along the western boundary of the site could be maintained as a walking trail and could be extended to follow the riparian forest edge to the southern boundary fence (Figure 6).
3. Only foot traffic should be allowed on the site; bicycles should be prohibited.

### 4.3 **Recreational Activities**

#### 4.3.1 Background

The site could provide open space for the public to enjoy various passive recreational pursuits. At present, no recreational activities take place on the site with the exception of some limited birdwatching during the winter, spring and summer. The conservation easement for the property prohibits any activity

that is inconsistent with the intent of preservation of the wetland property. The easement also permanently prohibits domestic animals (dogs, cats, horses) and motorized vehicles.

The West Delta Park Recreation Plan includes a section for the Vanport Wetlands as follows:

As a wetland mitigation site designed for increasing habitat value for waterfowl and other wildlife, the Vanport Wetlands site should be limited to passive recreational and educational activities, such as birdwatching, non-intrusive research projects or interpretive uses. All activities would be subject to conditions which minimize impacts during sensitive periods for wildlife and are compatible with Port of Portland security measures. Viewing areas should be limited to the perimeter of the site outside the property boundaries and in the vicinity of the historic facility building.

The Port has explored the possibility of using the PIR property to the south and the Tri-met Max stations as locations for interpretive signage. PIR has provided provisional approval, however Tri-met has indicated that no signage would be permitted at their stations.

#### **4.3.2 Considerations**

The entire property is being managed as wetland or upland habitat. As a consequence recreational uses of the property are limited and would need to be non-intrusive to be consistent with the intent of preservation of the wetland property as specified in the conservation easement. Recreational activities may need to be limited to certain times of the year or to certain sections of the property in order to limit disturbance to sensitive wildlife and habitat.

#### **4.3.3 Recommendations**

1. Recreational use should be limited to passive activities, such as bird watching and nature viewing.
2. Disturbance in areas known to be used by breeding or nesting wildlife should be avoided; this may result in certain restrictions during specific times of the year.
3. Viewing areas should be established around the perimeter of the site, such as on the PIR property to the south and along the Expo Road sidewalk to the east, to encourage viewers to the site but limit disturbance on the site.
4. On-site interpretive signs could be positioned in areas that are readily accessible, such as by the entrance gate or along the upland track.
5. Off-site interpretive signs would be accessible all year and could be positioned in areas such as the PIR property to the south and/or along Expo Road to the east.

### **4.4 Educational Use**

#### **4.4.1 Background**

The site provides opportunities for educating students on habitat interaction, seasonal hydrological changes and wetland, riparian and upland wildlife and vegetation. Because of the site's habitat diversity, educational use could be promoted for all age groups from kindergarten children through college researchers.

#### **4.4.2 Considerations**

Groups would need to be supervised while on site until the Port has received permit closure (estimated to be 2007); after closure other arrangements that are compatible with the conservation easement and conservation objectives for the site could be considered. In allowing large groups on site, consideration will need to be given to the disturbance that might occur, particularly from small children, during

sensitive times for wildlife. Whether as groups or individuals, walking around the site would need to be restricted to trails to avoid trampling of wetland vegetation. Research projects could cause disturbance (digging, collecting) that is incompatible with the conservation goals and objectives. Parking and access issues would also need to be considered.

#### 4.4.3 Recommendations

1. An organization should be identified that could manage the educational use of the site; a process for notification and access would need to be developed with the Port.
2. Passive research projects (e.g. no digging, minimal if any collecting, etc.) should be promoted, a registration system established to record the types of projects being carried out and students encouraged to publicize their results.

### 4.5 **Vanport Wetlands Transmission Facility**

#### 4.5.1 Background

The Vanport Wetlands transmission facility is the only remaining structure on site associated with the old Vanport Wetlands and has been recommended for listing on the National Register of Historic Places by the State Historic Preservation Office as a property of local significance. A web-based documentary on the towers, building and associated structures has been developed by the Port ([http://www.portofportland.com/portstories/rt\\_welcome.asp](http://www.portofportland.com/portstories/rt_welcome.asp)). The building sits at a low elevation on the site and is surrounded by water at elevation 6 feet NGVD; with average rainfall years, the building is inaccessible due to flooding from January through June.

The building has undergone major changes in structure since it was first constructed in 1931. Recent studies by the Port, including a structural engineering analysis, have demonstrated that the building is in very poor structural condition and a potential danger. The survey also noted that the building did not meet City code requirements, including American Disabilities Act (ADA) and Fire and Life Safety (FLS) requirements. Consequently, reuse of the building for other activities is not considered practicable.

The building is currently used by owls, pigeons and nesting swallows. The Port has erected two bat boxes on one of the outside walls.

#### 4.5.2 Considerations

The building is not accessible for approximately 6 months of the year. This could restrict timely emergency repairs in the event portions of the structure prove unstable. However, there is a Memorandum of Agreement with the State Historic Preservation Office to manage the building so that it does not fall into disrepair. Due to the present condition of the building as well as the inaccessibility during the winter and spring, managing and repairing the building to meet SHPO requirements does not appear to be a cost-effective use of Port funds.

The building provides some limited habitat for certain bird species.

#### 4.5.3 Recommendations

1. The Port should explore amending the MOA to allow demolition of the building.
2. If the amendment to the MOA is accepted, the Port should remove the building.
3. The bat boxes should be relocated, and swallow nesting platforms should be considered in other areas of the site.

## **4.6 Upland Habitat Management**

### **4.6.1 Background**

The property surrounding the central wetland is currently being managed by the Port to provide a mosaic of habitat types, including upland meadow, upland scrub shrub and upland riparian forest, to support a variety of songbirds and neotropical migrants as well as certain life stages of amphibians and reptiles. Invasive weeds are regularly removed; native woody and herbaceous species have been planted and/or seeded.

The Port is also continually providing habitat improvements in the upland area. Wood duck boxes have been erected in the wetland forest in the southwest corner of the property. Surveys for red-legged frog are ongoing, although no success in finding this species has yet occurred. Large woody debris has been placed in both upland and wetland habitat.

The drainage ditch in the northwestern and southwestern sections of the property is bordered by cottonwood riparian habitat. These sections are connected by a subterranean central section, and there is a steep gradient between the two daylighted sections. The Port investigated daylighting the entire length, however the steep gradients precluded this. The ground above the subterranean portion of the ditch has been identified in the mitigation plan as a buffer zone and has been planted with ash, cottonwood, western red cedar, red elderberry and Douglas hawthorn.

### **4.6.2 Considerations**

Upland habitat surrounding a wetland is essential for providing life history requirements for many species, such as insectivorous birds, amphibians and reptiles. Prior to Port ownership, no management in these areas occurred, and the site was dominated by invasive weeds. In order to control the spread of these invasives and to continue to improve the biodiversity of the site, ongoing management is essential.

### **4.6.3 Recommendations**

1. Existing upland habitat should continue to be managed as a mosaic of upland habitat types and not be converted to wetland or multi-use areas.
2. The current invasive weed management program being implemented by the Port should be continued until such time that a dominant native community is well established.
3. Alterations in the uplands, such as new trails, should be placed in locations that do not increase edge habitat, do not divide habitat and do not reduce upland habitat acreage.

## **4.7 Wetland Habitat Management**

### **4.7.1 Background**

The Port is managing approximately 68 acres as emergent wetland habitat, most of which is located within the site's central lakebed. Flood management of the wetland is determined annually based on management priorities. For reed canarygrass control, water levels are maintained to their maximum within the basin (approximately 8 feet NGVD on average rainfall years) through the growing season; for mosquito and bull frog control, water levels are pumped down to ensure little standing water after July. Overwintering and nesting waterfowl and shorebirds benefit from impounded water during the winter and spring months, while shorebirds are attracted to the exposed mudflats during the summer when water levels are gradually drawn down. By autumn, only the swale still retains some amount of water, and bird numbers on the site are significantly reduced.

The entire central wetland acreage has been used as mitigation for wetland impacts from off-site Port activities. Only several acres of invasive-weed infested riparian wetland along the western boundary of the site still have some limited potential to be used as mitigation property.

#### **4.7.2 Considerations**

The ability to manage water levels on the site is paramount in efforts to reduce the density of reed canarygrass and promote a native emergent community. Given the tremendous amount of weed seed in the soil and from plants that thrive along the wetland fringe, it is unlikely that reed canarygrass will ever be contained to the point where flood control is unnecessary; in the long-term, however, flooding may not need to occur on an annual basis. Removal of surface water by August would still be desirable to control mosquito populations, reduce bull frog breeding areas, allow the regrowth of native flora and remove poor quality, stagnant water.

#### **4.7.3 Recommendations**

1. Flooding through June and gradual drawdown through July should continue throughout the monitoring period required by the permits to maximize control of reed canarygrass and limit mosquito and bull frog breeding areas.
2. Long-term management of water levels should be driven by adaptive management to optimize overwintering, nesting and shorebird habitat as well as promote a dominant native vegetation community.
3. The use of herbicides within the five-foot elevation contour of the central wetland should be limited to invasive species other than reed canarygrass, which should continue to be controlled by water management.

### **4.8 Long-term Management**

#### **4.8.1 Background**

The Port uses adaptive management techniques to maintain and manage its mitigation properties. This means that monitoring of sites continues on an on-going basis and maintenance occurs on an as-needed basis. The ultimate goal is to achieve a site that is self-sustaining, where the native plant diversity supports healthy wildlife use and invasive species are found in minimal stands. The local community has expressed strong support for the Port's efforts to manage the site for wildlife and has expressed an interest in being able to enjoy the site in the long-term. Following completion of its permit requirements, the Port encourages public use and management of the site. This, however, must be within the limits of the conservation easement which restricts activities that may be in conflict with the site's conservation objectives.

#### **4.8.2 Considerations**

The Port's mission is focused on transportation, and it does not have the staff resources for long-term management of recreational or conservation property. The Vanport Wetlands conservation easement requires that the site be managed for conservation purposes. There are several long-term management options for the Port to consider. These include continuing to maintain the Vanport Wetlands as a Port natural area site, to identify a land management group to manage the site or to donate or sell the property to an interested conservation organization.

**4.8.3 Recommendations**

1. The Port should continue to manage the site in perpetuity to ensure protection of its habitat value or should identify an organization to take over the long-term management or ownership of the property.
2. If the Port decides to maintain ownership of the site, an annual budget to cover maintenance of the property should be established.

**4.9 Force Road Property**

**4.9.1 Background**

The Port has acquired a 7.13 acre parcel from Metro along the northwest corner of the Vanport Wetlands. The property currently supports approximately 1.1 acres of wetland, with the remaining acreage being disturbed upland. The Port intends to incorporate this piece of property into the Vanport Wetlands site and to use enhancement or restoration of the property towards future mitigation needs. The conceptual design by the Port and its consultant proposes to restore both wetland and upland habitat by removing much of the fill material down to 10 feet NGVD, widening the existing swale and creating four shallow ponds. The goals of the design are to restore and enhance wetland habitat, create amphibian breeding habitat, enhance and create habitat for neotropical birds, provide habitat connectivity with the Vanport Wetlands and enhance the existing upland by retaining mature trees and controlling invasive species.

**4.9.2 Considerations**

Implementing the design is not expected to occur until there is a need for additional mitigation property by the Port. However, there would be environmental benefits gained by restoring the site in advance of the need for mitigation. Early restoration of the site would also help to control invasive weeds which border the Vanport Wetlands.

**4.9.3 Recommendations**

1. The Port should consider carrying out the restoration of the site in advance of the Port's need for mitigation and obtain confirmation from the regulatory agencies for advanced credit.



## **FIGURES**

## APPENDIX A

### LIST OF PLANT SPECIES RECORDED IN 2001 (BASELINE)

PLANT SPECIES	NATIVE / NON-NATIVE	SITE LOCATION	RELATIVE ABUNDANCE
<b>HERBACEOUS</b>			
reed canarygrass ( <i>Phalaris arundinacea</i> , FACW)	non-native	entire wetland	very abundant (dominant species)
stinging nettle ( <i>Urtica dioica</i> , FAC+)	native	interspersed with reed canarygrass	common associate with reed canarygrass
climbing nightshade ( <i>Solanum dulcamara</i> , FAC+)	non-native	ditches and east tower depression areas	common in ditches; dominant in east tower depression areas
teasel ( <i>Dipsacus sylvestris</i> [[ <i>fullosum</i> ssp. <i>sylvestris</i> ]], FAC)	non-native	wetland edge-W	common within narrow band along edge
soft rush ( <i>Juncus effusus</i> , FACW)	native	wetland edge-E and SW	occasional
slough sedge ( <i>Carex obnupta</i> , OBL)	native	wetland edge-SE	some within a very small and isolated area
Columbia sedge ( <i>Carex aperta</i> , OBL)	native	wetland edge-SW	some within narrow band along edge
wooly sedge ( <i>Carex lanuginosa</i> , OBL)	native	western wetland edge	common in small areas
American water plantain ( <i>Alisma plantago-aquatica</i> , OBL)	native	east tower depression areas	common
bentgrass ( <i>Agrostis</i> spp., FAC)	non-native	wetland edge-SW	common within narrow band along edge
cattail ( <i>Typha latifolia</i> , OBL)	native	central ditch	few
small-fruited bulrush ( <i>Scirpus microcarpus</i> , OBL)	native	central ditch, eastern wetland	common in small area on ditch bank; common with rcg in small area along east boundary
hardstem bulrush ( <i>Scirpus acutus</i> , OBL)	native	central ditch and east tower depression areas	isolated groupings; spreading in tower depression areas

PLANT SPECIES	NATIVE / NON-NATIVE	SITE LOCATION	RELATIVE ABUNDANCE
broadleaf arrowhead ( <i>Sagittaria latifolia</i> , OBL)	native	central ditch	several small groupings
nodding beggars-tick ( <i>Bidens cernua</i> , FACW+)	native	east tower depression areas	common
spotted ladysthumb ( <i>Polygonum persicaria</i> , FACW)	non-native	wetland edge and central ditch	occasional
waterpepper ( <i>Polygonum hydropiperoides</i> , OBL)	native	central ditch, SW drainageway, east tower depression areas	common in ditch, occasional in tower depressions
water smartweed ( <i>Polygonum amphibian</i> , OBL)	native	central ditch	
Himalayan blackberry ( <i>Rubus discolor</i> , FACU)	non-native	wetland edge-W side	occasional in narrow band along edge and central wetland
common duckweed ( <i>Lemna minor</i> , OBL)	native	central ditch	common in middle and northern section
common thistle ( <i>Cirsium vulgare</i> , FACU)	non-native	mostly S wetland area and along access roads	few in wetland; common along roads
straight-beaked buttercup ( <i>Ranunculus orthorhynchus</i> , FACW-)	native	isolated area on E side	few
spotted cats-ear ( <i>Hypochaeris radicata</i> , FACU)	non-native	east tower depression areas	occasional
curve-pod yellow-cress ( <i>Rorippa curvisiliqua</i> , OBL)	native	east tower depression areas	occasional along edges
catchweed bedstraw ( <i>Galium aparine</i> , FACU)	native	wetland and fringe	occasional
curly dock ( <i>Rumex crispus</i> , FAC+)	non-native	wetland and fringe	occasional
common horsetail ( <i>Equisetum arvense</i> , FAC)	native	east side	few
<b>SHRUBS</b>			
red-osier dogwood ( <i>Cornus stolonifera</i> [[ <i>sericea</i> ]], FACW)	native	E and W sides	large groupings; isolated

PLANT SPECIES	NATIVE / NON-NATIVE	SITE LOCATION	RELATIVE ABUNDANCE
red elderberry ( <i>Sambucus racemosa</i> , FACU)	native	wetland area-N	2 large plants; isolated
Sitka willow ( <i>Salix sitchensis</i> , FACW)	native	wetland edge-N	few
<b>TREES</b>			
Oregon ash ( <i>Fraxinus latifolia</i> , FACW)	native	E, SE, and SW area	few; isolated
black cottonwood ( <i>Populus trichocarpa</i> [ <i>balsamifera</i> ], FAC)	native	E side, N edge	common in small area of east side and north edge
Pacific willow ( <i>Salix lasiandra</i> , FACW)	native	wetland edge-N; east tower depression areas	common in edge area; colonizing tower edge
Scouler willow ( <i>Salix scouleriana</i> , FAC)	native	SW corner	1 large individual
Columbia willow ( <i>Salix fluviatilis</i> , FACW)	native	wetland edge-N	few in edge area; colonizing mowed area
Douglas' hawthorn ( <i>Crataegus douglasii</i> , FAC)	native	SW corner edge	few; some large individuals
cultivated apple ( <i>Pyrus malus</i> , NOL)	non-native	near radio building	1 large individual
sweet cherry ( <i>Prunus avium</i> , NOL)	non-native	next to access road	1 individual

## LIST OF PLANT SPECIES RECORDED IN 2003

Scientific Name	Common Name	Wet Class	Native	Life Cycle
<i>Achillea millefolium</i> *	common yarrow	FACU	N	perennial
<i>Agrostis exarata</i> *	spike bentgrass	FACW	N	perennial
<i>Agrostis stolonifera</i>	spreading bentgrass	FAC	I	perennial
<i>Agrostis tenuis</i>	colonial bentgrass	FAC	I	perennial
<i>Alisma plantago-aquatica</i> *	American water plantain	OBL	N	annual
<i>Amaranthus powellii</i>	Powell's amaranth	-	I	-
<i>Beckmannia syzigachne</i> *	American sloughgrass	OBL	N	annual
<i>Bidens cernua</i>	nodding beggar's tick	FACW+	I	annual
<i>Bidens frondosa</i>	leafy beggar's tick	FACW+	N	annual
<i>Bromus carinatus</i> *	California brome	-	N	perennial
<i>Bromus mollis</i>	soft chess	UPL	I	annual
<i>Carex languinosa</i>	wooly sedge	OBL	N	perennial
<i>Carex stipata</i>	sawbeak sedge	OBL	N	perennial
<i>Chenopodium album</i>	lamb's quarters	FAC	I	annual
<i>Chenopodium rubrum</i>	red goosefoot	FACW+	N	annual
<i>Chrysanthemum leucanthemum</i>	oxeye daisy	FACU	I	perennial
<i>Cirsium arvense</i>	Canada thistle	FACU	I, invasive	perennial
<i>Cirsium vulgare</i>	common thistle	FACU	I, invasive	biennial
<i>Conyza canadensis</i>	horseweed	FACU	I	annual
<i>Cornus stolonifera</i> *	red-osier dogwood	FACW	N	shrub
<i>Crataegus douglasii</i> *	black hawthorn	FAC	N	tree
<i>Cyperus erythrorhizos</i>	redroot flatsedge	FACW	N	annual
<i>Daucus carota</i>	queen Anne's lace	NOL	I	biennial
<i>Deschampsia caespitosa</i> *	tufted hairgrass	FACW	N	perennial
<i>Dipsacus sylvestris</i>	teasel	FAC	I, invasive	biennial
<i>Echinochloa crusgalli</i>	barnyard grass	FACW	I	annual
<i>Echinodorus berteroi</i>	upright burhead	OBL	N (Cal.)	annual
<i>Eleocharis ovata</i> *	ovate spikerush	OBL	N	annual
<i>Elymus glaucus</i> *	blue wildrye	FACU	N	perennial
<i>Epilobium watsonii</i>	Watson's willow-herb	FACW-	N	perennial
<i>Equisetum arvense</i>	common horsetail	FAC	N	annual
<i>Festuca arundinacea</i>	tall fescue	FAC-	I	perennial
<i>Fraxinus latifolia</i> *	Oregon ash	FACW	N	tree
<i>Gnaphalium uliginosum</i>	small cudweed	OBL	N	annual
<i>Holcus lanatus</i>	common velvetgrass	FAC	I	perennial
<i>Hypericum perforatum</i>	St. John's wort	UPL	I	annual
<i>Juncus bufonius</i>	toad rush	FACW	N	annual
<i>Juncus effusus</i>	soft rush	FACW	N	perennial
<i>Juncus tenuis</i>	slender rush	FACW-	N	perennial

Scientific Name	Common Name	Wet Class	Native	Life Cycle
<i>Lactuca serriola</i>	willow lettuce	FACU	I	biennial
<i>Lolium perenne</i>	perennial ryegrass	FACU	I	perennial
<i>Lonicera involucrata</i>	black twinberry	FAC+	N	shrub
<i>Matricaria matricarioides</i>	pineapple weed	FACU	N	annual
<i>Navarretia squarrosa</i>	skunkweed	UPL	I	annual
<i>Parentucellia viscosa</i>	yellow parentucellia	FAC-	I	perennial
<i>Phalaris arundinacea</i>	reed canarygrass	FACW	I, invasive	perennial
<i>Physocarpus capitatus</i>	Pacific ninebark	FACW	N	shrub
<i>Plagiobothrys figuratus</i>	fragrant popcorn flower	OBL	N	annual
<i>Plantago lanceolata</i>	English plantain	FAC	I	perennial
<i>Poa pratensis</i>	Kentucky bluegrass	FAC	N	perennial
<i>Polygonum coccineum</i>	water smartweed	OBL	N	perennial
<i>Polygonum hydropiperoides</i>	swamp smartweed	OBL	N	perennial
<i>Polygonum persicaria</i>	lady's thumb	FACW	I	annual
<i>Populus trichocarpa</i> *	black cottonwood	FAC	N	tree
<i>Ranunculus scleratus</i>	celery-leaf buttercup	OBL	N	-
<i>Rhamnus purshiana</i> *	cascara	FAC-	N	tree
<i>Rorippa curvisiliqua</i>	curve-pod yellow-cress	OBL	N	annual
<i>Rorippa islandica</i>	marshy yellow-cress	OBL	N	annual
<i>Rosa nutkana</i> *	Nootka rose	FAC	N	shrub
<i>Rosa pisocarpa</i> *	clustered wild rose	FAC	N	shrub
<i>Rubus discolor</i>	Himalayan blackberry	FACU	I, invasive	perennial
<i>Rumex crispus</i>	curly dock	FACW	I	perennial
<i>Sagittaria latifolia</i> *	broad-leaf arrowhead (wapato)	OBL	N	perennial
<i>Salix fluviatilis</i> *	Columbia willow	FACW	N	shrub
<i>Salix lasiandra</i> *	Pacific willow	FACW+	N	tree
<i>Salix piperi</i> *	Piper's willow	FACW	N	shrub
<i>Salix sitchensis</i> *	Sitka willow	FACW	N	shrub
<i>Sambucus racemosa</i> *	red elderberry	FACU	N	shrub
<i>Scirpus validus</i> *	soft-stemmed bulrush	OBL	N	perennial
<i>Solanum dulcamara</i>	bittersweet nightshade	OBL	I, invasive	perennial
<i>Solanum nigrum</i>	black nightshade	FACU	I, invasive	annual
<i>Sonchus asper</i>	prickly sowthistle	FAC-	I	annual
<i>Sparganium eurycarpum</i> *	giant bur-reed	OBL	N	perennial
<i>Spiraea douglasii</i> *	Douglas' spirea	FACW	N	shrub
<i>Symphoricarpos albus</i> *	snowberry	FACU	N	shrub
<i>Thuja plicata</i> *	western red cedar	FAC	N	tree
<i>Trifolium arvense</i>	hare's-foot clover	NOL	I	annual
<i>Trifolium pratense</i>	red clover	FACU	I	biennial
<i>Trifolium repens</i>	white clover	FAC	I	perennial
<i>Typha latifolia</i>	broad-leaf cattail	OBL	N	perennial

Scientific Name	Common Name	Wet Class	Native	Life Cycle
<i>Veronica americana</i>	American speedwell	OBL	N	perennial
<i>Veronica chamaedrys</i>	germander speedwell	-	I	-

\*Planted by project

N = native, I = introduced

Wetland Classification\*\*: OBL – Obligate wetland (almost always in wetlands); FACW – Facultative Wetland (usually in wetlands); FAC – Facultative (equally likely to occur in wetlands or non-wetlands); FACU – Facultative Upland (usually in non-wetlands); NOL – Not Listed (almost always occur in non-wetlands)

\*Source: Reed's *National List of Plant Species that Occur in Wetlands: Northwest (Region 9)* and the *1993 Supplement* to this list.

## APPENDIX B WILDLIFE OBSERVATIONS, 2003

Common Name	Species	Months Observed	Associated Habitat
<b>BIRDS</b>			
Accipiter, unidentified	unidentified	1	fo
*American coot	<i>Fulica americana</i>	1, 2, 3, 4, 5, 6, 7, 9	ow
American crow	<i>Corvus brachyrhynchos</i>	1, 2, 6, 7, 9, 11, 12	fo, pem
American goldfinch	<i>Carduelis tristis</i>	5, 6, 7, 8, 9, 10, 12	pss, fo, pfo
American kestrel	<i>Falco sparverius</i>	1, 3, 9, 11, 12	um, uf
*American robin	<i>Turdus migratorius</i>	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	fo, pfo, pem, pss
American wigeon	<i>Anas americana</i>	1, 2, 3, 4, 5	ow
Baird's sandpiper	<i>Calidris bairdii</i>	8	pem
bald eagle	<i>Haliaeetus leucocephalus</i>	1, 2, 3, 4, 5	pem, fo
barn swallow	<i>Hirundo rustica</i>	5, 6, 7, 8, 9	fo, ud
belted kingfisher	<i>Ceryle alcyon</i>	12	ow
Bewick's wren	<i>Thryomanes bewickii</i>	1, 2, 4, 6, 7, 10, 11, 12	uss, pfo
black-capped chickadee	<i>Poecile atricapillus</i>	1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12	uf, pfo, pss
black-headed grosbeak	<i>Pheucticus melanocephalus</i>	6, 8	pfo
black-throated gray warbler	<i>Dendroica nigrescens</i>	6	pss
Brant	<i>Branta bernicla</i>	11	ow
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	6	pfo
brown creeper	<i>Certhia americana</i>	1, 3, 11	pfo
brown-headed cowbird	<i>Molothrus ater</i>	5, 6, 7	pfo, ud
bufflehead	<i>Bucephala albeola</i>	1, 2, 3, 4, 5, 12	ow
Bullock's oriole	<i>Icterus bullockii</i>	5, 6, 7	pfo
bushtit	<i>Psaltiriparus minimus</i>	3, 4, 5, 6, 7, 8, 9, 10, 11	pss
Canada goose (cackling, Western, lesser)	<i>Branta canadensis</i>	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	ow, ud, pem
canvasback	<i>Aythya valisineria</i>	5	ow
Caspian tern	<i>Sterna caspia</i>	7	fo
cedar waxwing	<i>Bombycilla cedrorum</i>	6, 8, 10	pfo
*cinnamon teal	<i>Anas cyanoptera</i>	4, 5, 6, 7, 8, 9	ow
chipping sparrow	<i>Spizella passerina</i>	4	uss
*cliff swallow	<i>Petrochelidon pyrrhonota</i>	5, 6, 7, 9	fo
common snipe	<i>Gallinago gallinago</i>	1, 2, 8, 9	pem
common yellowthroat	<i>Geothlypis trichas</i>	5, 6, 7, 8, 9	um, pss
dark-eyed junco	<i>Junco hyemalis</i>	1, 2, 3	pss



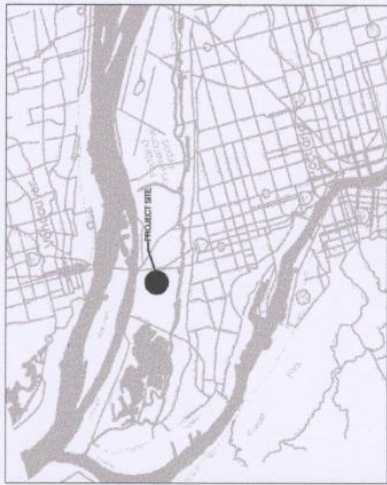
Common Name	Species	Months Observed	Associated Habitat
double-crested cormorant	<i>Phalacrocorax auritus</i>	1, 2, 9	fo
downy woodpecker	<i>Picoides pubescens</i>	1, 2, 5, 7, 8, 9, 11	h, pfo
dunlin	<i>Calidris alpina</i>	4	pem
Eurasian teal	<i>Anas crecca</i>	12	ow
Eurasian wigeon	<i>Anas penelope</i>	4	ow
*European starling	<i>Sturnus vulgaris</i>	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	uf, pem, pss, pfo
fox sparrow	<i>Passerella iliaca</i>	12	pss
gadwall	<i>Anas strepera</i>	1, 2, 3	ow
glaucus-winged gull	<i>Larus glaucescens</i>	1,	ud
golden-crowned sparrow	<i>Zonotrichia atricapilla</i>	1, 2, 3, 4, 12	pss, uf
great blue heron	<i>Ardea herodias</i>	1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12	ud, pss, um, fo, pem
great egret	<i>Ardea alba</i>	10	ow
greater scaup	<i>Aythya marila</i>	1, 2, 3, 4, 5, 12	ow
greater yellowlegs	<i>Tringa melanoleuca</i>	4, 7, 8, 9	pem
green-winged teal	<i>Anas carolinensis</i>	1, 2, 3, 4	ow, pem
gull, unidentified	<i>Larus sp.</i>	2, 4, 8, 11, 12	fo, pem
hooded merganser	<i>Lophodytes cucullatus</i>	4	ow
house finch	<i>Carpodacus mexicanus</i>	7, 8, 9	pfo
killdeer	<i>Charadrius vociferus</i>	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	ud, pem
least sandpiper	<i>Calidris minutilla</i>	4, 5, 6, 7, 8	pem
lesser scaup	<i>Aythya affinis</i>	1, 2, 3	ow
lesser yellowlegs	<i>Tringa flavipes</i>	5, 8	pem
long-billed dowitcher	<i>Limnodromus scolopaceus</i>	4, 7, 8, 9	pem
*mallard	<i>Anas platyrhynchos</i>	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12	ow, fo, pem
mourning dove	<i>Zenaida macroura</i>	3, 6, 8, 9, 11, 12	pfo, pss
northern flicker	<i>Colaptes auratus</i>	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	pfo
northern harrier	<i>Circus cyaneus</i>	2, 3	fo
northern pintail	<i>Anas acuta</i>	1, 2, 3, 12	ow
northern shoveler	<i>Anas clypeata</i>	1, 2, 4, 5, 6, 11, 12	ow
northern shrike	<i>Lanius excubitor</i>	2	pss
osprey	<i>Pandion haliaetus</i>	8	fo
pectoral sandpiper	<i>Calidris melanotos</i>	8	pem
peregrine falcon	<i>Falco peregrinus</i>	2	fo
*pied-billed grebe	<i>Podilymbus podiceps</i>	1, 4, 5, 6, 7, 8	ow
redhead	<i>Aythya americana</i>	5	ow
red-necked phalarope	<i>Phalaropus lobatus</i>	9	pem
red-tailed hawk	<i>Buteo jamaicensis</i>	1, 2, 4, 5, 8, 9, 10, 11, 12	pfo, uf, fo
red-winged blackbird	<i>Agelaius phoeniceus</i>	1, 2, 3, 4, 5, 6, 7, 8, 9	pss, pfo

Common Name	Species	Months Observed	Associated Habitat
ring-billed gull	<i>Larus delawarensis</i>	1,	ud
ring-necked duck	<i>Aythya collaris</i>	1, 2, 4	ow
Ross's goose	<i>Chen rossii</i>	12	ow
rough-legged hawk	<i>Buteo lagopus</i>	1, 12	pfo
ruby-crowned kinglet	<i>Regulus calendula</i>	1, 2, 3, 11, 12	pss
ruddy duck	<i>Oxyura jamaicensis</i>	1, 2, 3, 4, 5, 6, 7	ow
sandpiper, unidentified		9	pem
Savannah sparrow	<i>Passerculus sandwichensis</i>	4, 5, 6, 7, 9	um, pss
scaup, unidentified	<i>Aythya</i> sp.	4	ow
semipalmated plover	<i>Charadrius semipalmatus</i>	8	pem
sharp-shinned hawk	<i>Accipiter striatus</i>	9	pem
short-billed dowitcher	<i>Limnodromus griseus</i>	8	pem
snow goose	<i>Chen caerulescens</i>	1, 11	pem
song sparrow	<i>Melospiza melodia</i>	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	pss
sora	<i>Porzana carolina</i>	6	pem
*spotted sandpiper	<i>Actitis macularia</i>	5, 6, 7, 8	pem
spotted towhee	<i>Pipilio maculatus</i>	12	um
swallow, unidentified		9	
swan, unidentified	<i>Cygnus</i> sp.	1	fo
tree swallow	<i>Tachycineta bicolor</i>	3, 5, 6	fo, pfo
turkey vulture	<i>Cathartes aura</i>	9	fo
violet-green swallow	<i>Tachycineta bicolor</i>	4, 8	fo
Virginia rail	<i>Rallus limicola</i>	6	pem
western gull	<i>Larus occidentalis</i>	1,	ud
western sandpiper	<i>Calidris mauri</i>	6, 7, 8	pem
western scrub jay	<i>Aphelocoma californica</i>	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	uf, pfo, pss
western tanager	<i>Piranga ludoviciana</i>	5	pfo
*western wood-peewee	<i>Contopus sordidulus</i>	5, 6, 7, 9	pfo
white-crowned sparrow	<i>Zonotrichia leucophrys</i>	3, 4, 6, 12	pem, pss
white-faced ibis	<i>Plegadis chihi</i>	6	pem
willow flycatcher	<i>Empidonax traillii</i>	6	pss
yellow-rumped warbler	<i>Dendroica coronata</i>	1, 2, 3, 4, 5, 10, 12	pss, pfo
yellow warbler	<i>Dendroica petechia</i>	6	pss
<b>MAMMALS</b>			
bat (unidentified)		7	fo
beaver	<i>Castor canadensis</i>	2, 3, 4, 7	ow
big brown bat	<i>Eptesicus fuscus</i>	6	fo

Common Name	Species	Months Observed	Associated Habitat
black-tailed deer	<i>Odocoileus hemionus</i>	1, 7, 8, 10	um
cottontail rabbit	<i>Sylvilagus floridanus</i>	1, 2, 5, 6, 10	uss, pss, um
coyote	<i>Canis latrans</i>	1, 6, 9, 10	pem
house cat	<i>Felis catus</i>	3	um
little brown bat	<i>Myotis lucifugus</i>	6	fo
mole	<i>Scapanus</i> sp.	1, 3, 4, 6, 7, 8, 10, 11	um
nutria	<i>Myocastor coypus</i>	5, 8, 9	ow
opossum	<i>Didelphis virginianus</i>	9	ud
raccoon	<i>Procyon lotor</i>	2, 4, 6, 7, 8, 9	pem
gray squirrel	<i>Sciurus</i> sp.	1,	uf
vole	<i>Microtus</i> sp.	3, 8	um
<b>HERPTILES</b>			
garter snake	<i>Thamnophis</i> sp.	6, 7, 8, 9, 10, 11	um
bullfrog	<i>Rana catesbeiana</i>	3, 4, 6, 7	pem
common garter snake	<i>Thamnophis sirtalis</i>	5	ud
pacific treefrog	<i>Hyla regilla</i>	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	pem, pss
long-toed salamander	<i>Ambystoma macrodactylum</i>	2, 3, 5, 10, 11	pss
<b>INVERTEBRATES</b>			
<b>ODONATA</b>			
blue dasher	<i>Pachydiplax longipennis</i>	7	pss
green darner	<i>Anax junius</i>	7	pem
paddle-tailed darner (?)	<i>Aeshna palmata</i>	7	pem
Pacific forktail	<i>Ischnura cervula</i>	7	pem
tule bluet	<i>Enallagma carunculatum</i>	7	pem

**KEY**

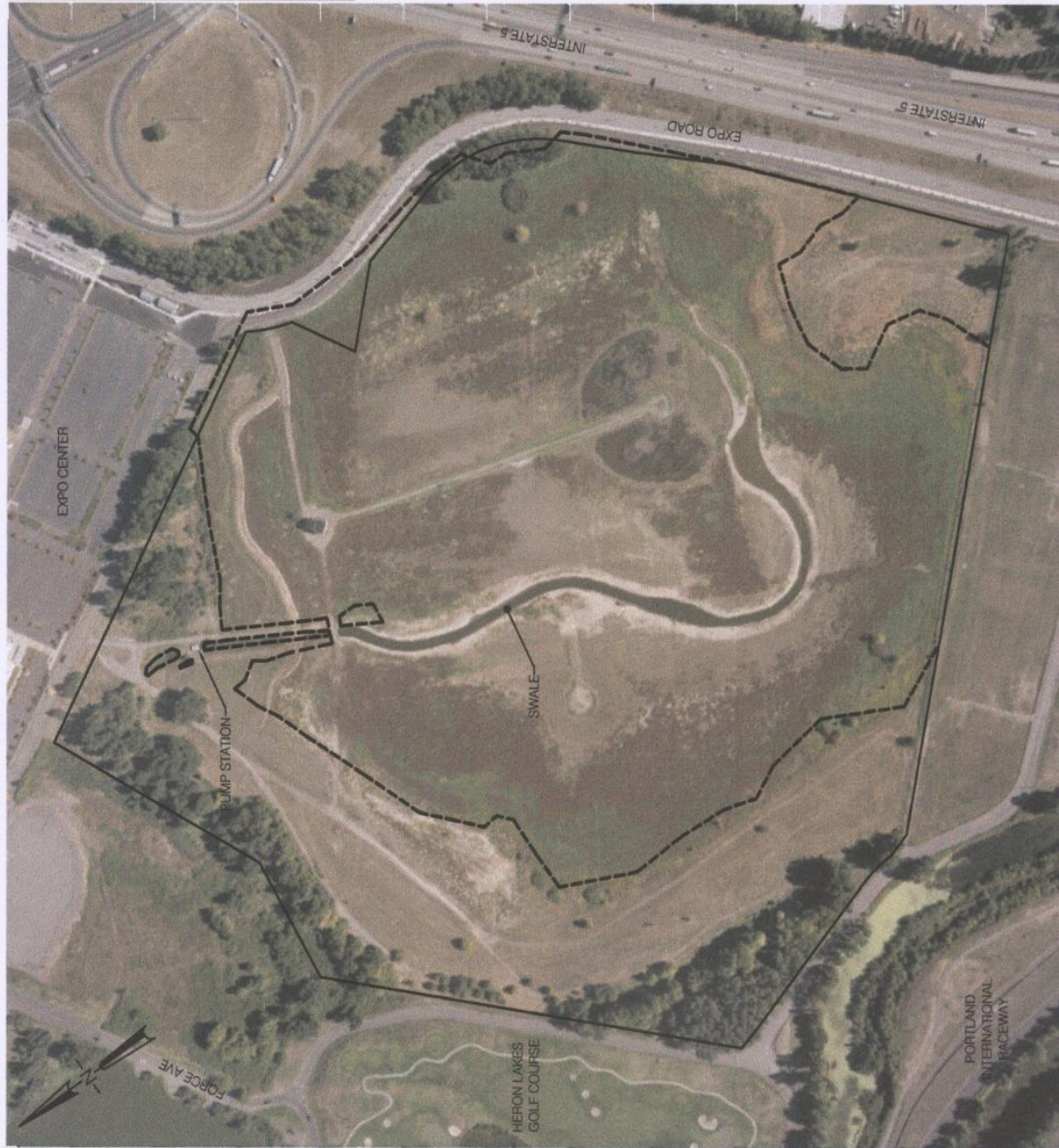
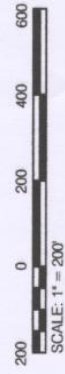
- \* nest or downy young observed
- fo= fly over
- h= heard
- ow= open water
- pem= emergent wetland
- pfo= forested wetland
- pss= wetland shrub-scrub
- ud= upland developed
- uf= upland forest
- um= upland meadow
- uss= upland shrub-scrub



VICINITY MAP  
SCALE: N.T.S.

LEGEND:

- = WETLAND BOUNDARY
- = PORT PROPERTY



PORT OF PORTLAND  
PORTLAND, OREGON



VANPORT WETLANDS

VANPORT WETLANDS  
SITE LOCATION FIGURE 1

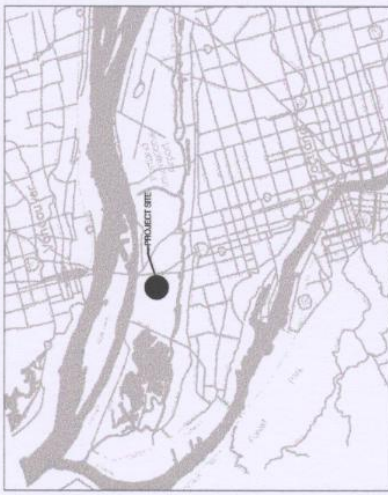
DESIGNED BY	D. RENNIS
DRAWN BY	L. VOGT
CHECKED BY	D. RENNIS
DATE	JULY 2004
SCALE	1"=200'
SUBMITTED BY	
PROJECT MANAGER	
TYPE	PD
DRAWING NO.	ANZ 2004-4366
	1/1
	P-1

2004PCEN	1113
COPIES NUMBER	PROJECT NUMBER

NO.	DATE	BY	REVISIONS	OKD	APPVD

SC	BK
SC	BK





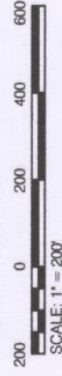
VICINITY MAP  
SCALE: N.T.S.

LEGEND:

- UM = UPLAND MEADOW
- UF = UPLAND FOREST
- UD = UPLAND DEVELOPED (ACCESS ROADS)
- USS = UPLAND SCRUB / SHRUB
- PSS = PALUSTRIAN EMERGENT WETLAND
- PEM = PALUSTRIAN FORESTED WETLAND
- PFO = PALUSTRIAN FORESTED WETLAND

- WETLAND BOUNDARY
- BUFFER
- BLOCK TRANSECTS (FISHMAN ENVIRONMENTAL)
- MONITORING TRANSECTS

- STAFF GAUGE
- OBSERVATION WELL (MONITORING WELL)
- PHOTO CONTROL POINT

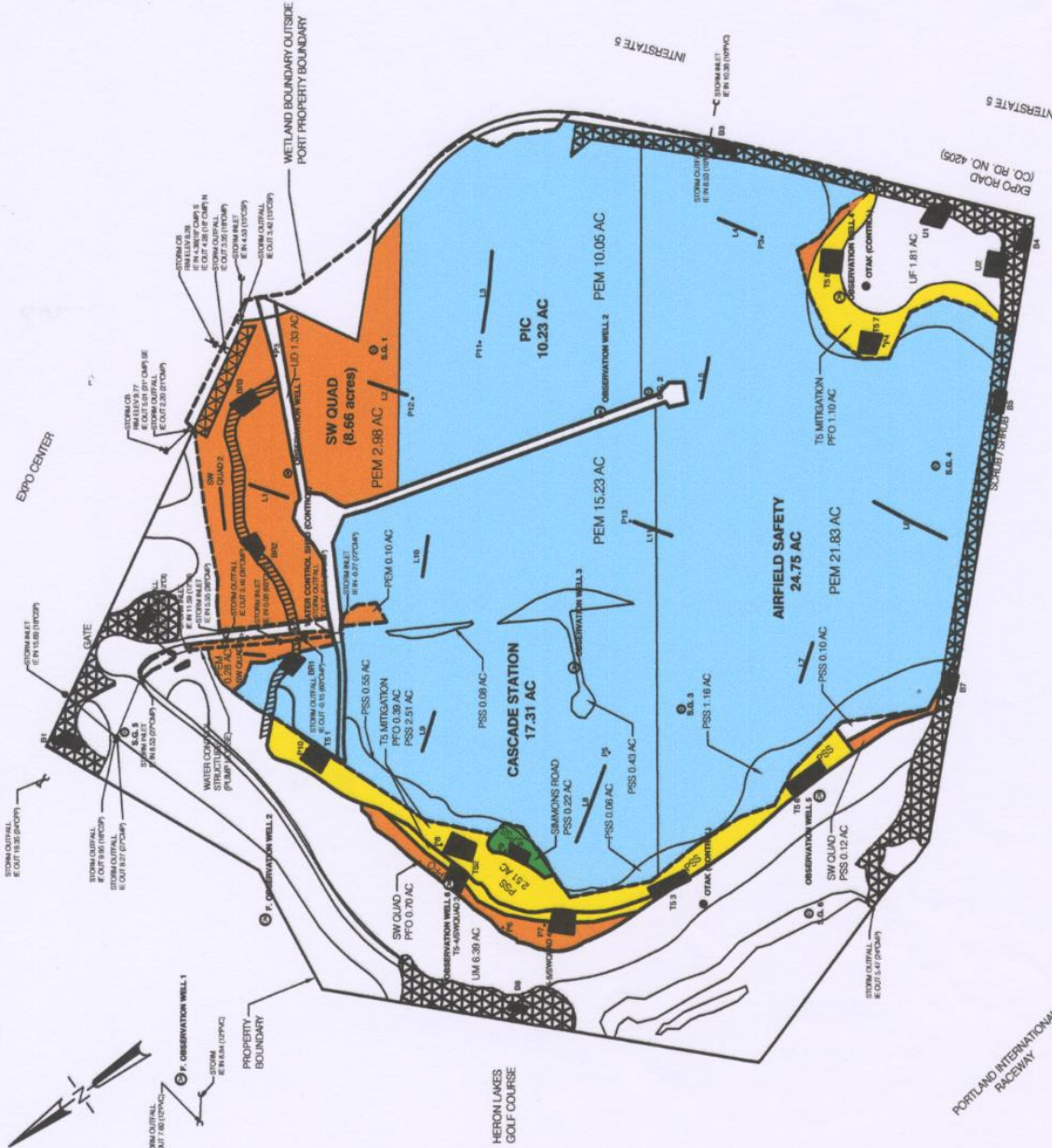


VANPORT WETLANDS

VANPORT WETLANDS

MITIGATION ACREAGE ALLOCATION FIGURE 2

DESIGNED BY	D. RENNIS
DRAWN BY	L. VOIST
CHECKED BY	D. RENNIS
DATE	JULY 2004
SCALE	1" = 200'
SUBMITTED BY	
PROJECT MANAGER	
TYPE	PD
ANZ	2004-4366
1/1	P-1



PORT OF PORTLAND  
PORTLAND, OREGON



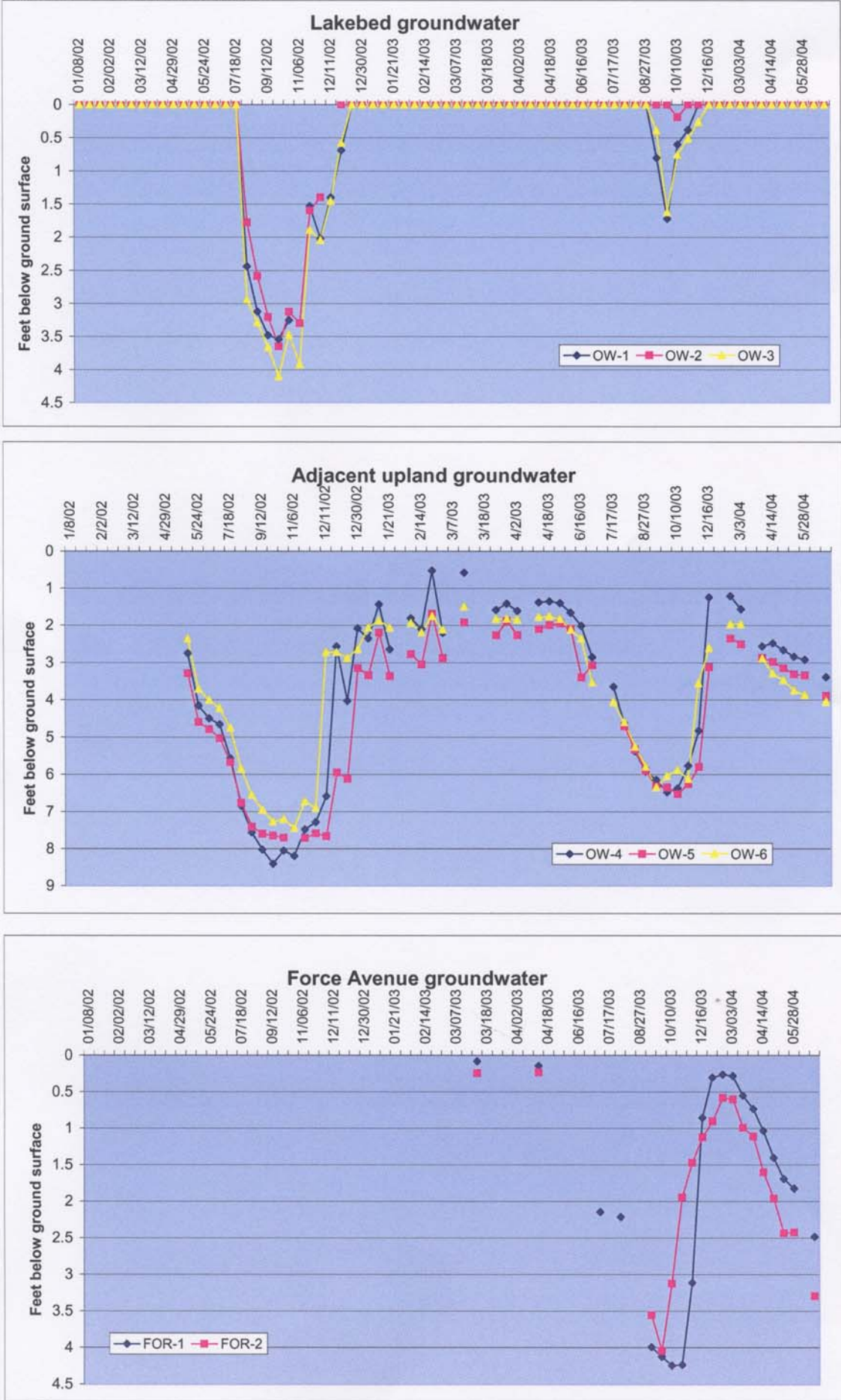
1113  
PROJECT NUMBER

2004PCEN  
DESIGN NUMBER

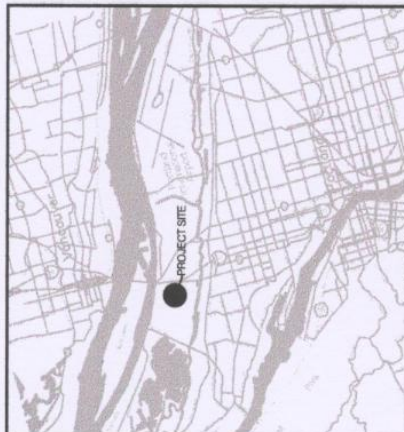
NO.	DATE	BY	REVISIONS	CHKD	APPVD

SC	BK
SC	BK

Figure 3. Groundwater Elevations





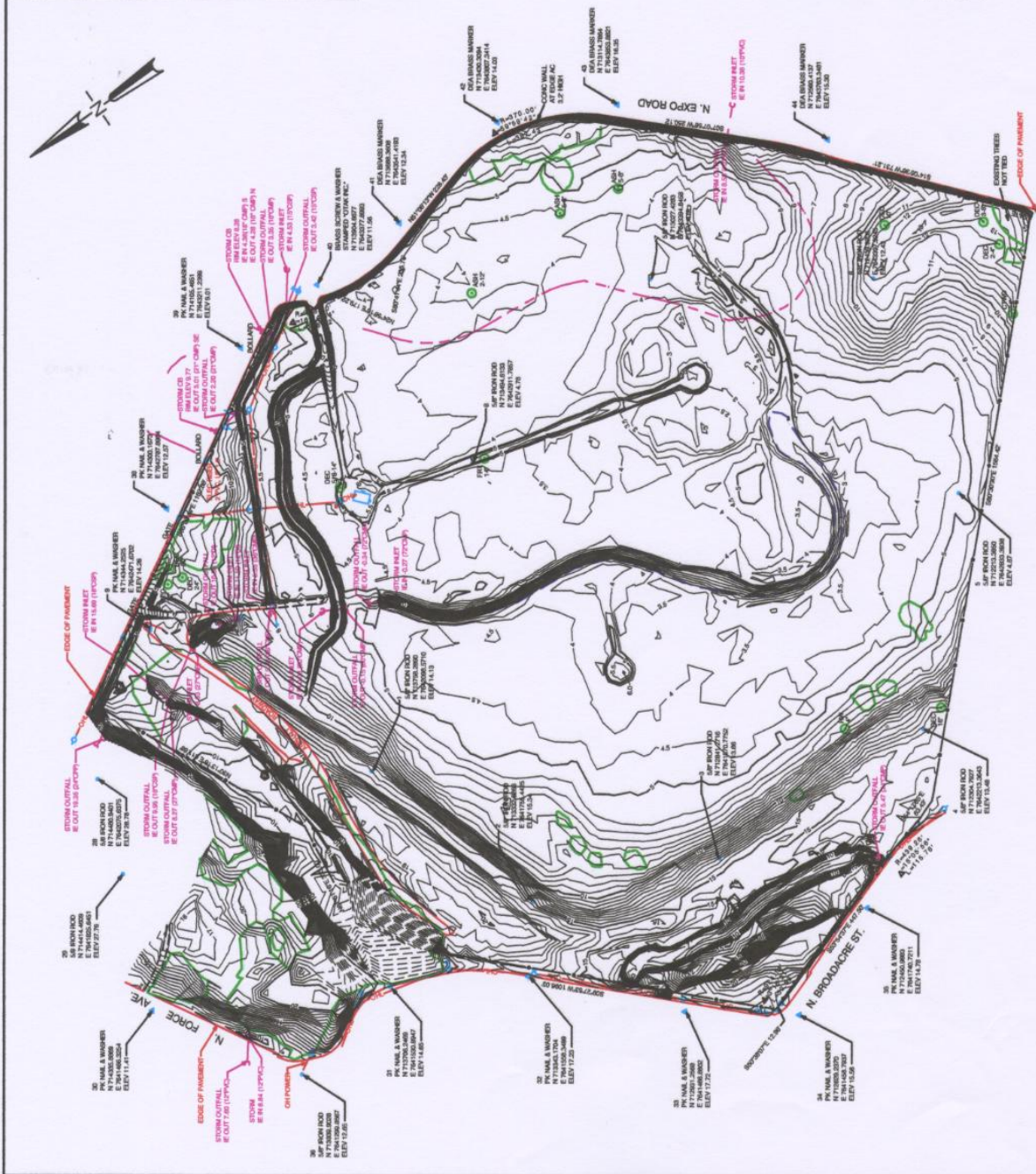
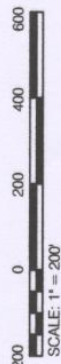


VICINITY MAP  
SCALE: N.T.S.

LEGEND

- SET FROM ROD WITH RED PLASTIC CAP MARKED 'OTAK CONTROL'
- ▲ SET OR FOUND SURVEY CONTROL MONUMENT AS NOTED
- POWER POLE
- ⊕ STREET LIGHT
- GUY LINE
- STORM DRAIN CATCH BASIN
- STORM DRAIN CULVERT
- ELECTRIC RISER
- OVER-HEAD UTILITY LINE
- UTILITY BREAK
- EVERGREEN TREE
- DECIDUOUS TREE
- EDGE OF GRAVEL
- EDGE OF WATER
- CHAINLINK FENCE
- BOLLARD
- CONCRETE SEWER PIPE
- CORRUGATED PLASTIC PIPE
- CORRUGATED METAL PIPE
- VEGETATION LINE
- GUARD RAIL

NOTE: CONTOURS IN HEAVY BRUSH ARE APPROXIMATE AND ARE SHOWN AS DASHED LINES  
CONTOUR INTERVAL IS 0.5 FEET



PORT OF PORTLAND  
PORTLAND, OREGON



VANPORT WETLANDS

VANPORT WETLANDS  
SITE TOPOGRAPHY FIGURE 4

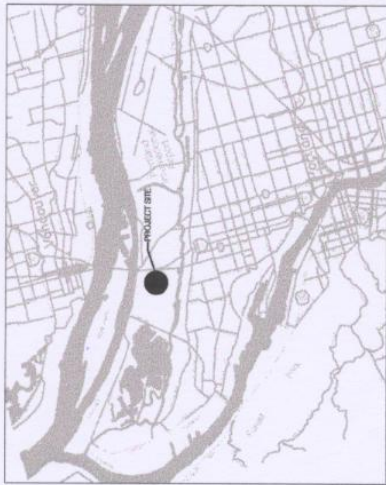
DESIGNED BY D. RENNIS  
DRAWN BY L. VOGT  
CHECKED BY D. RENNIS  
DATE JULY 2004  
SCALE 1"=200'

SUBMITTED BY PROJECT MANAGER  
TYPE PD  
DRAWING NO. ANZ 2004-4366  
1/1 P-1

2004 PCEN  
1113  
PROJECT NUMBER

NO.	DATE	BY	REVISIONS	CHKD	APPVD





VICINITY MAP  
SCALE: N.T.S.

LEGEND:

UM = UPLAND MEADOW (6.39 ACRES)  
 UF = UPLAND FOREST (12.23 ACRES)  
 UD = UPLAND DEVELOPED (ACCESS ROADS) (2.55 ACRES)  
 USS = UPLAND SCRUB / SHRUB (1.91 ACRES)  
 PSS = PALUSTRIAN SCRUB / SHRUB (9.72 ACRES)  
 PEM = PALUSTRIAN EMERGENT WETLAND (52.80 ACRES)  
 PFO = PALUSTRIAN FORESTED WETLAND (5.32 ACRES)  
 (BUFFER AND / OR BANK INCLUDED IN TOTALS)

SWALES 2.27 ACRES  
 (INCLUDED IN PEM TOTAL ACREAGE)

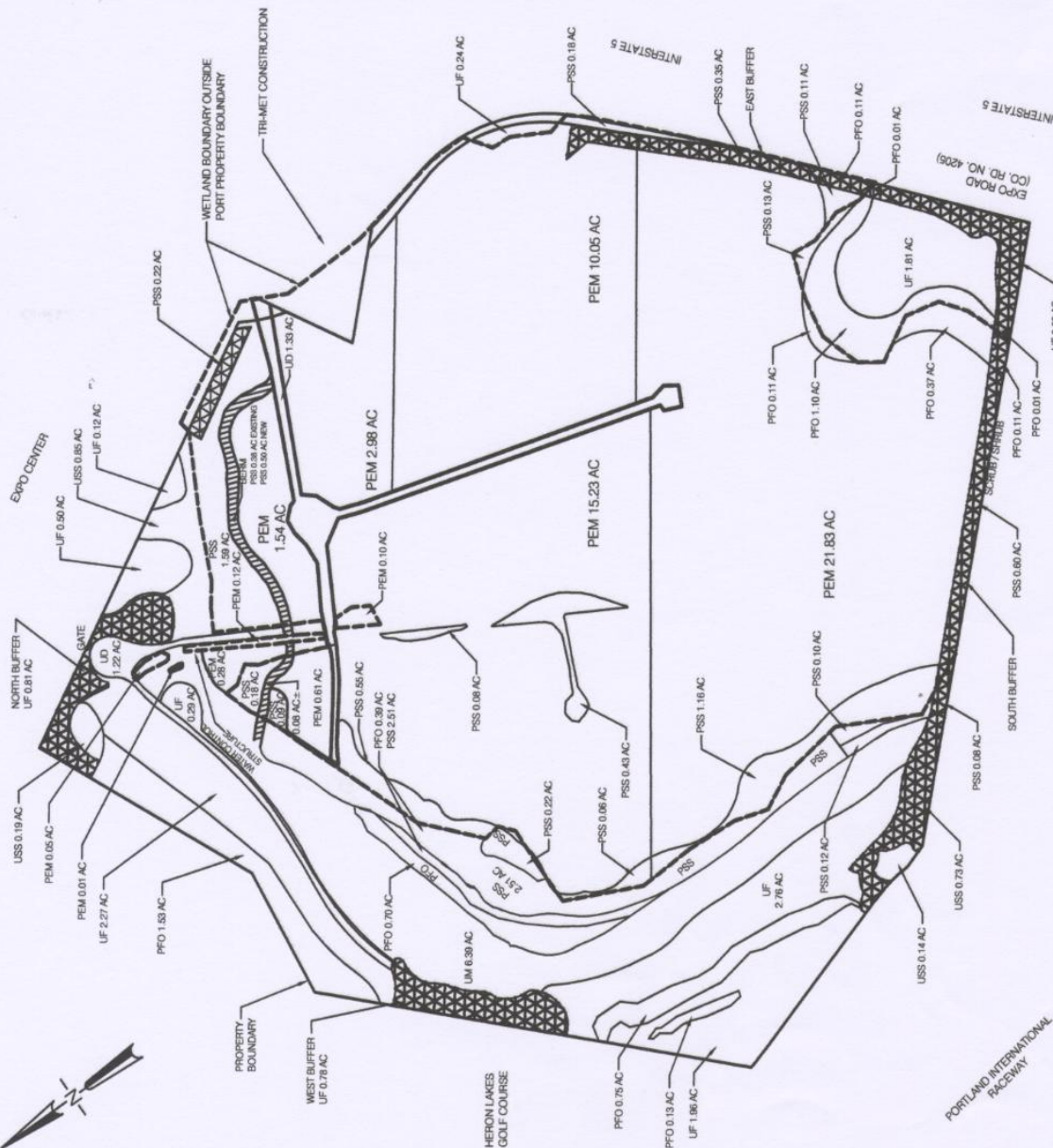
BANK PLANTING TOTAL 0.88 ACRES  
 (INCLUDED IN PSS TOTAL ACREAGE)  
 TOTAL AREA BUFFER (4.68 ACRES)

UF BUFFER (2.28 ACRES)  
 PFO BUFFER (0.24 ACRES)  
 PSS BUFFER (1.43 ACRES)  
 USS BUFFER (0.73 ACRES)

WETLAND BOUNDARY  
 BUFFER



SCALE: 1" = 200'



PORT OF PORTLAND  
 PORTLAND, OREGON



DESIGNED BY D. REINIS

DRAWN BY L. VOGT

CHECKED BY D. REINIS

DATE JULY 2004

SCALE 1" = 200'

VANPORT WETLANDS

VANPORT WETLANDS  
 HABITAT TYPES FIGURE 5

SUBMITTED BY PROJECT MANAGER

TYPE PD

ANZ 2004-4366

1/1

P-1

SC	BK
SC	BK

NO.	DATE	BY	REVISIONS	OKD	APPD





**LEGEND:**

- WETLAND BOUNDARY
- ▨ BUFFER
- \* FENCE / PROPERTY BOUNDARY
- ◆ POTENTIAL SITES FOR INTERPRETIVE SIGNAGE



SC	BK
SC	BK

				PORT OF PORTLAND PORTLAND, OREGON				DESIGNED BY D. RENNIS				VANPORT WETLANDS											
				2004PGEN DESIGN NUMBER				1113 PROJECT NUMBER				DRAWN BY L. VOGT				VANPORT WETLANDS							
NO.				DATE				BY				REVISIONS				CWD				APPD			
SUBMITTED BY				PROJECT NUMBER				DATE				JULY 2004				CHECKED BY				D. RENNIS			
TYPE				PD				ANZ				2004-4366				1/1				P-1			